

# A NEW AND VERY LARGE CRIOCERATID AMMONOID FROM THE CRETACEOUS OF CENTRAL AUSTRALIA

By PROFESSOR WALTER HOWCHIN AND DR. F. W. WHITEHOUSE

Text figs. 143-145.

THE South Australian Museum is indebted to Mounted Constable T. Jury, at one time stationed at Oodnadatta, for a very fine example of an ammonoid shell which he discovered in the Cretaceous argillaceous limestone of the interior of the continent. The specimen was found in the banks of the Arkerunga Creek, forty-eight miles south-westward of Oodnadatta, and situated on the north-eastern flanks of Stuart's Range, between Giddi-Giddinna Creek and Oodgelina Creek (Pastoral Plan, Sheet No. 14). See map in text (fig. 143).

In the first instance Mr. Jury forwarded to Adelaide only a portion of the shell that had fallen free from the matrix. The specimen was of such evident scientific interest that under the courteous permission of the Commissioner of Police (Brigadier-General Leane), Mr. Jury was requested to obtain, if possible, the remainder of the fossil. This work was carefully executed, and with the exception of the primordial whorls, which were broken off prior to its entombment, the specimen is in perfect condition, and is the largest example, and one of the most complete, of its kind known.

## REFERENCES TO THE LITERATURE OF THE AUSTRALIAN CRIOCERATIDS.

In 1867 Professor McCoy obtained a specimen from the head of the Flinders River, Queensland, which he named *Ancyloceras flindersi* (4). This very imperfectly known species is of enormous size. McCoy did not figure the holotype, the necessary figure being given in 1909 by Etheridge (18, pl. 39, fig. 1).

*Crioceras australe* was founded by Moore in 1869 (5, p. 257) on a specimen from Wallumbilla Creek, Queensland. The type specimen, which was very incomplete, was destroyed in the Sydney Garden Palace fire of September 22, 1882. Owing to the loss of the type, much confusion has arisen as to the interpretation of the species. One of us (Whitehouse, 21, p. 214) has lately chosen a neotype of the species, which was then referred tentatively to the genus *Tropaeum*.

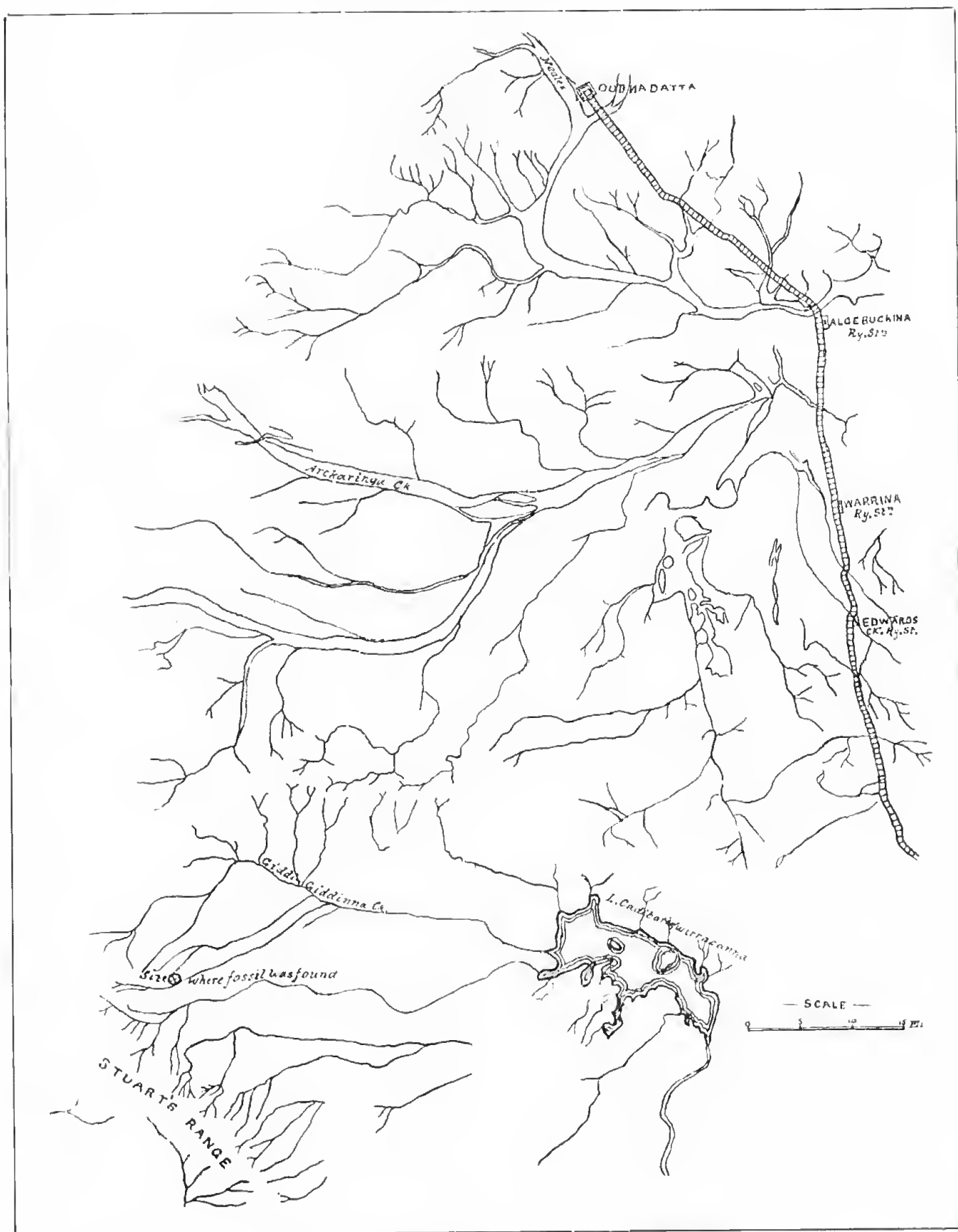


Fig. 143. Shows locality where the fossil was found.

In 1875 Waagen (6) recorded and figured from Kutch, in India, a portion of a large crioceratid as *Crioceras australe* Moore. This specimen has been examined by one of us (F.W.W.). Though belonging to the genus *Australiceras*, so typical of the Australian Aptian, it represents a species as yet unknown in Australia, and for which a new specific name is required.

The name *Crioceras jackii* was erected in 1880 by Etheridge (7) for a Walsh River (Queensland) specimen. This species was selected later by Whitehouse as the genotype of *Australiceras* (*v. inf.*).

In 1883, Etheridge (8) recorded further crioceratid fragments from North-West Queensland.

In 1883, Tenison-Woods (9) gave the name *Crioceras irregulare* to a new form from the Palmer River (Queensland). The specific name was abandoned by Etheridge in 1892, but re-erected by Whitehouse in 1926, and placed in the genus *Australiceras*.

Ratte in 1886 published a note (10) on a large fragment referred by him to *Crioceras australe*. The specimen has not been examined by either of us; and from the figure it is not quite clear to which of the species, into which *Crioceras australe* has been split, this form belongs.

At the first meeting of the Australasian Association for the Advancement of Science (1887), the late Professor Ralph Tate (12) supplied a "List of Cretaceous fossils of the Lake Eyre Basin," in which *Crioceras australe* finds a place; but the author gives no particulars as to the locality where it was found or to the name of the discoverer. The specimen to which he referred is probably that presented to the Adelaide University by Mr. J. J. East, and mentioned by him in 1889 in a paper on the geology of Central Australia (13).

In 1892, Etheridge (14), in his revision of the fossil floras and faunas of Queensland, reviewed the Cretaceous ammonoids. He described and referred to the crioceratid species already named as *Ancyloceras flindersi* McCoy, *Crioceras australe* Moore, and *Crioceras* sp. ind. As new species were erected *Hamites* (?) *laqueus*, *Ancyloceras taylori*, and *Crioceras edkinsi*, the name *Crioceras jackii* Eth. fil. was abandoned, it being recorded in the synonymy of *Crioceras australe*. Many new locality records were given.

In the report of the Horn Expedition, 1896, Tate and Watt acknowledge the gift of "examples of *Crioceras australis*" from Charlotte Waters (15, p. 63), but no further notices of the specimens are available.

In two papers published in 1902 (16 and 17), Etheridge recorded the Cretaceous ammonites known from New South Wales and South Australia, but no additions were made to the species.

In 1905, Etheridge (18) took the opportunity, in describing a collection of fossils from Dalhousie Springs, to add still further notes on the Australian

crioceratids. *Crioceras australe* Moore, *C. jackii* Eth. fil., and *C. irregulare* Tenison-Woods were regarded as identical and placed under the name *C. australe*. Further record was made of *Crioceras (Ancyloceras) flindersi*, and a new species, *Ancyloceras cordycepoides* was erected. *Anisoceras* (?) sp. was recorded.

Etheridge's main revision (20) of the crioceratids appeared in 1909. In this very important and magnificently illustrated paper a vast wealth of material was described. At that time confusion existed in all countries on the relation of the loosely coiled ammonoids. Etheridge saw that the accepted classifications were unsatisfactory, and, in placing the species in such accepted genera, saw that future generic revision would be needed. He described and figured the following species: *Crioceras* (?) *leptus*; *Crioceras* sp. nov.; *C.* sp.; *C. jackii* Eth. fil. (synonym: *C. irregulare* Tenison-Woods); *C. nautiloides* sp. nov.; *C. aronoides* sp. nov.; *C. ammonoides* sp. nov.; *C. plectoides* sp. nov.; *C. flindersi* McCoy sp.; *C. lampros* sp. nov.; *C. cordycepoides* Eth. fil.; *C. laqueus* Eth. fil.; *C. taylori* Eth. fil. sp.; *C.* (?) sp.; and *Leptoceras* (?) *edkinsi* Eth. fil. sp.

The name *Crioceras australe* was abandoned.

In 1926 Whitehouse revised the whole of the ammonoid faunas of Eastern Australia. A number of new species were erected, and all names previously bestowed were retained, "*Crioceras*" *australe* Moore and "*C.*" *irregulare* Tenison-Woods being reinstituted. The Australian species were placed in the genera *Australiceras*\*, *Tropaeum*, *Toxoceratoides*, *Hamites*, *Labecceras*\*, *Appurdiceras*\*, *Anisoceras*, *Aletoceras*\*, *Myloceras*\* and *Flindersites*\*, the genera marked with an asterisk being new. Of these *Australiceras*, *Tropaeum* and *Toxoceratoides* belong to the Roma Series, the remaining genera coming from the Tambo Series. (In this paper the old "Rolling Downs formation" was divided into three series: The Morven Bed, the Roma Series, and the Tambo Series in ascending order.)

#### FAMILY ANCYLOCERATIDAE HYATT (EMEND WHITEHOUSE).

This family includes the lineage *Ancyloceras*, *Australiceras*, *Tropaeum*, and *Ammonitoceras*. *Australiceras*, which has trituberculation on the initial and final stages of the shell, but not on the intermediate stages, passes to *Tropaeum* by the complete loss of tubercles. On the specimen described below weak tubercles are faintly suggested on the final stage (the coarse costae of the body-chamber), but the initial whorls are not preserved. It is advisable, however, to retain the species in *Tropaeum* rather than in *Australiceras*.

**TROPAEUM IMPERATOR** sp. nov.

Fig. 144.

Coiling crioceratid; earliest whorls unknown, later whorls simply costate; while the costae of the body-chamber are coarse, widely spaced, and have *very* faint tri-tuberculation, in the intermediate stages the costae are reclined, slightly flexed, and number about 75 to 80 per whorl; the costae, which occasionally

Fig. 144. *Tropaeum imperator* sp. nov.

bifurcate near the umbilical shoulder, are separated by sulci of equal or greater width.

Densiseptate; septal suture U.U.L.E., the various elements highly indented; septal saddles prominently and deeply bifid; septal lobes regularly trifid (fig. 145).

This form, as mentioned below, agrees perfectly with *Australiceras lampros* (Etheridge fil.) in details of ribbing, septal sutures, dimensions, and whorl-section. In two features, however, it is clearly distinct: the size is very much larger and the tuberculation is practically absent, though faintly suggested on the body-chamber. This undoubtedly represents a further example of a species-lineage changing from *Australiceras* to *Tropaeum* by the orthogenetic loss of tuberculation.

The specimen is of particular interest on account of its enormous size. It is by far the largest crioceratid known, though, of course, not the largest of the ammonoids. That distinction belongs to the well-known *Pachydiscus seppenradensis* Landois, from the Turonian of Westphalia, which reaches a diameter of 2 metres.

Very large size was attained in ammonoid stocks at various times. The Lower Lias, with *Coroniceras*, *Vermiceras*, etc., the Portlandian with *Gigantites*, and the Turonian with *Pachydiscus*, *Austoniceras*, etc., are particularly noticeable.

Among heteromorphous forms the Ancyloceratidae in particular specialize in megalomorphs; for, as recently restricted by Whitehouse (23), the family is comprised of four genera, *Ancyloceras*, *Australiceras*, *Tropaeum*, and *Ammonitoceras*, each of which is made up almost wholly of species of gigantic size. The earliest of these genera, *Ancyloceras*, is the least remarkable in this regard, although forms like *A. matheronianum* d'Orbigny and *A. variante* d'Orbigny are outstanding. All four genera are represented in the Roma Series of the "Rolling Downs Formation" by large forms; while in other countries they are just as remarkable for their megalomorphs. In Europe, e.g., *Australiceras gigas* (Sowerby, 1, vi, p. 188, pl. 593, fig. 2), *Tropaeum haverbanki* (Sowerby, 3, p. 410, pl. 34, fig. 1), *T. hillsi* (Sowerby, 2, p. 339, pl. 15, figs. 1, 2), and related forms comprised a group, which, until the discovery of the Australian forms, contained probably the largest known heteromorphs. See, e.g., some of the forms figured by Sinzow (19). *Ammonitoceras* has correspondingly large species, e.g., *A. tovilense* Crick (22).

Genera belonging to other families which contain megalomorphs include *Crioceras* (*sensu stricto*), *Distoloceras*, *Hamites*, *Anisoceras*, and *Flindersites*. The three genera last mentioned are represented in the Tambo Series of the



Fig. 145. Septal suture of *Tropacum imperator* sp. nov.

Rolling Downs by species of very considerable size; indeed, when the complete shell of *Flindersites flindersi* McCoy (see 18, pl. 39, fig. 1) is found, it will probably rank among the largest known heteromorphs.

It is thus of interest that, in both the major divisions of the Rolling Downs, megalomorphs of outstanding size are represented; the particular significance of this is not yet apparent.

The shell was extracted from the matrix in thirteen pieces, which together measure 10 feet 3 inches. The following table gives the length of each fragment, the diameter of the whorls in two directions; the number of costae to the inch in the earlier whorls; and the width of the sulci, in inches, in the later.

| No. of Fragment. | Length of Fragment<br>in inches. | Diameter of Whorl<br>in inches. |                 | Costae,<br>Number to the<br>inch. |
|------------------|----------------------------------|---------------------------------|-----------------|-----------------------------------|
|                  |                                  | Vertical.                       | Transverse.     |                                   |
| 1                | 2 $\frac{1}{2}$                  | 1 $\frac{3}{4}$                 | 1 $\frac{5}{8}$ | 8 c. to 1 inch                    |
| 2                | 10 $\frac{1}{2}$                 | 2 $\frac{3}{4}$                 | 2 $\frac{1}{2}$ | 11 c. to 3 "                      |
| 3                | 12 $\frac{3}{4}$                 | 4                               | 3 $\frac{1}{2}$ | 11 c. to 5 "                      |
| 4                | 6 $\frac{1}{2}$                  | 4 $\frac{3}{4}$                 | 4 $\frac{1}{2}$ | 8 c. to 5 "                       |
| 5                | 12 $\frac{1}{2}$                 | 5 $\frac{1}{4}$                 | 4 $\frac{3}{4}$ | 5 $\frac{1}{2}$ c. to 5 "         |
| 6                | 5 $\frac{1}{2}$                  | —                               | —               | 5 c. to 5 "                       |
| 7                | 8 $\frac{1}{2}$                  | 6                               | 5 $\frac{1}{4}$ | 5 c. to 5 "                       |
| 8                | 4                                | 5 $\frac{3}{4}$                 | 4 $\frac{1}{2}$ | 3 c. to 4 "                       |
| 9                | 15                               | 6 $\frac{1}{2}$                 | 6 $\frac{1}{2}$ | 2 in. apart                       |
| 10               | 14                               | 7                               | 6 $\frac{1}{2}$ | 2-3 in. "                         |
| 11               | 6 $\frac{1}{2}$                  | 8                               | 7               | 4 $\frac{1}{2}$ in. "             |
| 12               | 16                               | 8 $\frac{1}{2}$                 | 7 $\frac{1}{2}$ | 4 in. "                           |
| 13               | 9                                | 8 $\frac{1}{2}$                 | 8               | 4 in. "                           |

#### NOTES ON AUSTRALICERAS LAMPROS (ETHERIDGE Fil.).

In 1909 Etheridge (20, p. 157, pl. 48) described as *Crioceras lampros*, then a new species, the body-chamber of a huge crioceratid. This specimen is in the collection of the Geological Survey of Queensland, and at that time the locality whence it came was not known. Previously, in 1886, Jack (11, p. 75) had recorded a large crioceratid from the Walsh River, fifteen miles above the Telegraph Station. Some time after Etheridge's paper had appeared it was found that the body-chamber forming the type of *A. lampros* fitted exactly on the end of this other specimen, the join leaving no doubt that the two forms were but fragments of the one individual.

This reconstructed holotype of *A. lampros* measures 540 mm. in diameter, its dimensions, given according to the usual conventions, being 540, 30, 32, 76. The early whorls were trituberculate, though the portion of the shell anterior to

the penultimate tuberculate costa is missing. Tuberculation ceases at a whorl-diameter of 165 mm., the succeeding costae being non-tuberculate. At a diameter of 355 mm. the costae become coarse and flange-like, and thenceforth are again trituberculate.

In 1926, Whitehouse (21) figured a British Museum specimen from the Upper Flinders River as *Australiceras lampros*. The specimen was one of a number examined from the same locality and collection, but none had either the initial or the final stage preserved. It was obvious, however, that the early trituberculation was faint, in this respect differing from the holotype. Both forms agreed in dimensions, whorl-shape, in the course of the ribs, and in having about 80 costae per whorl on the non-tuberculate portion.

The present specimen differs from *A. lampros*, as mentioned above, in the tuberculation having practically disappeared, so that the Flinders River specimens are thus morphologically, and apparently genetically, intermediate between *Australiceras lampros* and *Tropaeum imperator*.

Recently one of us (F.W.W., 23), in discussing the ammonoids of the Roma Series, pointed out that three divisions were palaeontologically possible, namely, in descending order: Beds with 1. *Sanmartinoceras*, 2. *Tropaeum*, 3. *Australiceras*, but that the ranges of the two general *Australiceras* and *Tropaeum* probably overlapped to a slight extent. The holotype of *Australiceras lampros*, with its prominent tubercles, is no doubt from a horizon well down in the *Australiceras* beds; on *Tropaeum imperator*, however, tuberculation is so indistinct that the form has apparently just crossed the border-line between *Australiceras* and *Tropaeum*. It is suggested, consequently, that the specimen was derived from the base of the beds with *Tropaeum*. The lineage of *A. lampros* thus has probably an extended range.

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